

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
25 April 2002 (25.04.2002)

PCT

(10) International Publication Number
WO 02/033894 A3

(51) International Patent Classification⁷: **H04L 12/28**,
12/56

(21) International Application Number: PCT/US01/32312

(22) International Filing Date: 17 October 2001 (17.10.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/241,450	17 October 2000 (17.10.2000)	US
60/275,206	12 March 2001 (12.03.2001)	US
09/903,423	10 July 2001 (10.07.2001)	US
09/903,441	10 July 2001 (10.07.2001)	US
09/923,924	6 August 2001 (06.08.2001)	US

(63) Related by continuation (CON) or continuation-in-part (CIP) to earlier applications:

US	60/241,450 (CIP)
Filed on	17 October 2000 (17.10.2000)

US	60/275,206 (CIP)
Filed on	12 March 2001 (12.03.2001)
US	09/903,423 (CIP)
Filed on	10 July 2001 (10.07.2001)
US	09/903,441 (CIP)
Filed on	10 July 2001 (10.07.2001)
US	09/923,924 (CIP)
Filed on	6 August 2001 (06.08.2001)

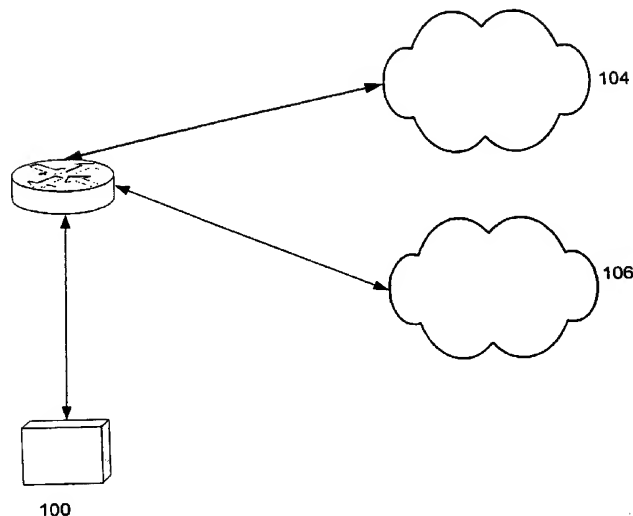
(71) Applicant (for all designated States except US): **ROUTE-SCIENCE TECHNOLOGIES, INC.** [US/US]; 167 2nd Avenue, San Mateo, CA 94401 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **BALDONADO, Omar, C.** [US/US]; 700 Alester Avenue, Palo Alto, CA 94303 (US). **FINN, Sean, P.** [US/US]; 1533 Escondido Way, Belmont, CA 94002 (US). **KARAM, Mansour, J.** [LB/US]; 707 Continental Circle, #421, Mountain View, CA 94040 (US). **LLOYD, Michael, A.** [US/US]; 160 Arundel Road, San Carlos, CA 94070 (US). **MADAN, Herbert, S.** [US/US]; 347 Blackfield Drive, Tiburon, CA 94920 (US). **MCGUIRE, James, G.** [US/US]; 2312 Gough Street, San Francisco, CA 94019 (US). **VILLAYERDE,**

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR PERFORMANCE AND COST OPTIMIZATION IN AN INTERNETWORK



(57) Abstract: Systems and methods are described for supporting routing intelligence for evaluating routing paths based on performance measurements. The routing intelligence may include processes executed in a self-contained device. This device may control one or more edge routers, based on performance data from end users. In other embodiments, the routing intelligence device may be used solely to monitor one or more edge routers, producing reports but not effecting any changes to routing. Routing decisions may be injected to the edge routers via BGP updates. The devices may be stationed at the premises of a multihomed organization, such as an enterprise, ISP, government organization, university, or other organization supporting a sub-network coupled to an internetwork. In other embodiments, the routing intelligence comprises processes executed on a router.



WO 02/033894 A3



Jose-Miguel, Pulido [ES/US]; 1020 Bryant Street, Palo Alto, CA 94301 (US).

(74) Agent: SUZUE, Kenta; Wilson Sonsini Goodrich & Rosati, 650 Page Mill Road, Palo Alto, CA 94304-1050 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

(88) Date of publication of the international search report:
21 August 2003

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/32312

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04L12/28 H04L12/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, IBM-TDB, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FRANCIS P ET AL: "An architecture for a global Internet host distance estimation service" INFOCOM '99. EIGHTEENTH ANNUAL JOINT CONFERENCE OF THE IEEE COMPUTER AND COMMUNICATIONS SOCIETIES. PROCEEDINGS. IEEE NEW YORK, NY, USA 21-25 MARCH 1999, PISCATAWAY, NJ, USA, IEEE, US, 21 March 1999 (1999-03-21), pages 210-217, XP010323734 ISBN: 0-7803-5417-6	1,2,5,9
A	pages 210-211, paragraph "Distance Metrics" page 212, line 29-36 --- -/--	11,14,20



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

11 March 2003

Date of mailing of the international search report

28 MAR 2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Hardelin, T

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/32312

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WANG Z ET AL: "Resource allocation for elastic traffic: Architecture and mechanisms" CONFERENCE PROCEEDINGS ARTICLE , 2000, XP010376681 page 165, paragraph 5.6 -page 166 -----	11-13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 01/32312

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-10,14-22

Method and device for routing data to a plurality of service provider access links

2. Claims: 11-13

Networking device for improving performance of edge routers